

# Four Ways to Optimize Your Electricity Use

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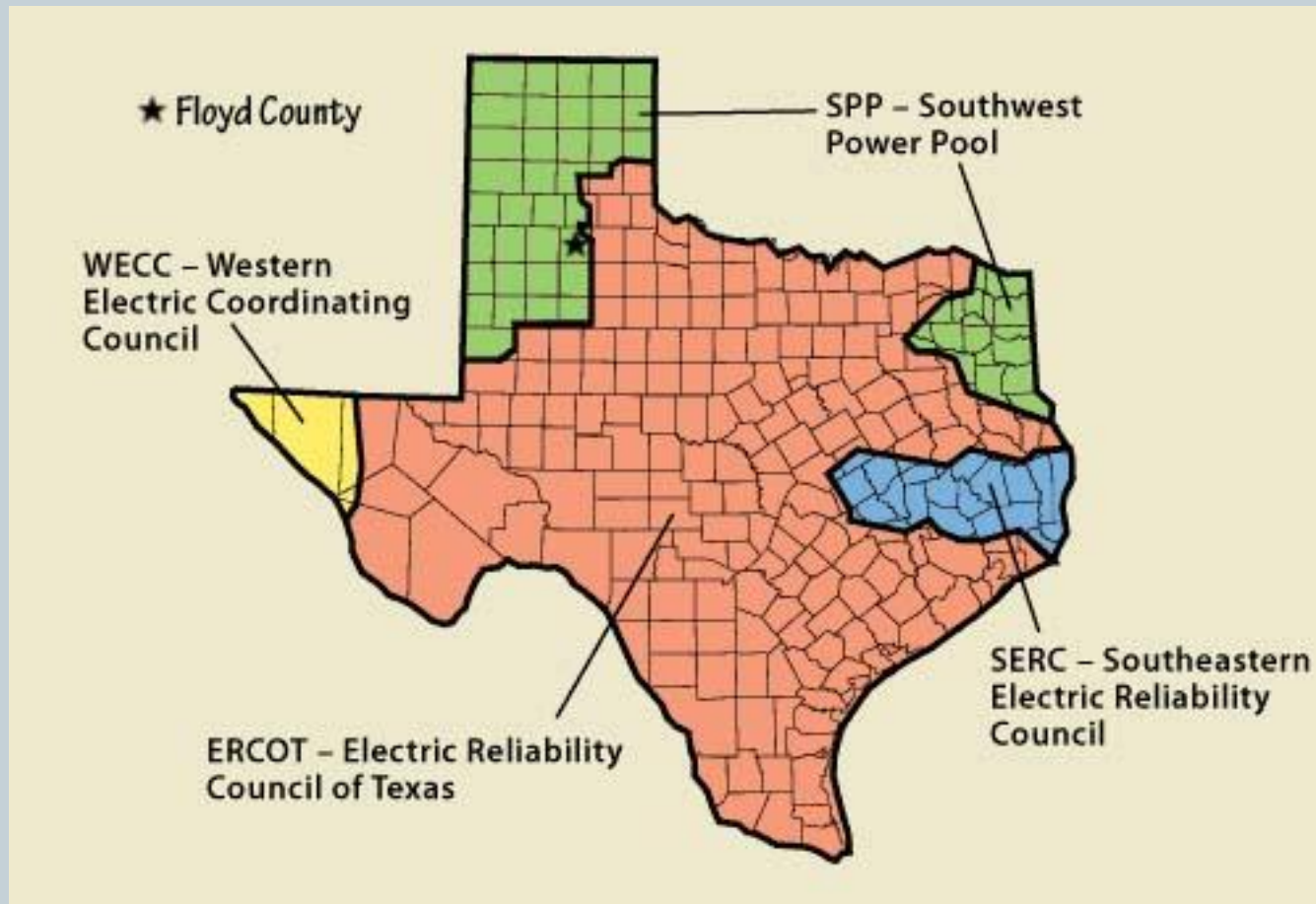
**ASSOCIATION OF WATER BOARD DIRECTORS-TEXAS  
CORPUS CHRISTI, TEXAS**

**COMMISSIONER KENNETH W. ANDERSON, JR.  
PUBLIC UTILITY COMMISSION OF TEXAS**

**JUNE 20, 2015**

# Electric Reliability Council of Texas (ERCOT)

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# ERCOT's Footprint

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- ERCOT is NOT synchronously interconnected to any other grid; only connected through 5 DC ties ranging from 36 MW to 600 MW capacity and totaling 1,106 MW. There are two additional ties of 1,500 MW and 3,000 MW under development for up to an additional 4,500 MW.
- ERCOT Region - \$32B electric market that covers 75% of Texas land region and almost 90% of the state's load.
- ERCOT has 41,500+ miles of transmission lines.
  - Loads pay for the transmission system (including all additions) based on *a pro rata share of coincident peak load*.
- Peak load: 68,305 MW on August 3, 2011.
- Total number of generating units: 550+. Total market participants: 1,100+.

# ERCOT's Footprint (cont'd)

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- Total Qualified Scheduling Entities (QSE): 402 as of the end of May 2014, with 104 representing neither load nor generation, 170 representing load, 82 representing generation and 46 representing both load and generation. Three QSEs represent distributed generation (DG) as emergency response service (ERS) generators.
- Total generation for 2014: 340 million MWh.
  - 73% competitive.
  - 16% municipalities.
  - 12% cooperatives.
- 98% of energy is settled in 15 minute intervals through data from AMI or IDR meters.

# ERCOT Wholesale and Retail Markets Designed To Operate As A Unified Whole

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“The Texas electricity wholesale and retail markets were designed at the onset as a unified whole to support the development of efficient markets in each.”

“Texas’ wholesale market was designed in conjunction with its retail market, with an array of policies put in place to ensure that market participants would have access to systems and facilities needed to participate in the market. Three aspects of the market design – tied to unbundling and divestiture, transmission access and cost-allocation, and market administration – are notable in this regard.”

“Texas designed its power market with the customer as its focal point ... Customer choice is considered both a right and responsibility, in ways more akin to the expectations of customers in other types of markets than in traditional electric service arrangements provided by monopoly utility companies.”

- Susan F. Tierney, Ph.D. *ERCOT Texas’ Competitive Power Experience: A View from the Outside Looking In*, October 2008.

# Scarcity Pricing in ERCOT

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- The system wide offer cap (SWOC) is currently \$9,000/MWh and represents the estimated value of lost load (VOLL) in the ERCOT market. When electricity is scarce, the price of electricity is expected to approach the VOLL (scarcity pricing).
- ERCOT has two mechanisms that allow for proper scarcity pricing: The SWOC and the operating reserve demand curve (ORDC) which adds a variable amount to the price of electricity and the same amount as a payment to available non-dispatched generation. The amount of this additional payment, if any, depends upon the generating capacity that is immediately available to the grid.

# Scarcity Pricing in ERCOT (cont'd)

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- Scarcity pricing is an important aspect of the competitive market. High prices during scarcity conditions promote market efficiency by encouraging efficient behavior.
- As prices increase consumers become motivated to reduce their consumption because economically the market treats a reduction in load similar to a generator producing more electricity.
- Scarcity pricing also encourages reliable operations from generators both to capture additional revenue and to avoid negative economic consequences from unit failures.

# Managing The Risk Of Scarcity Pricing

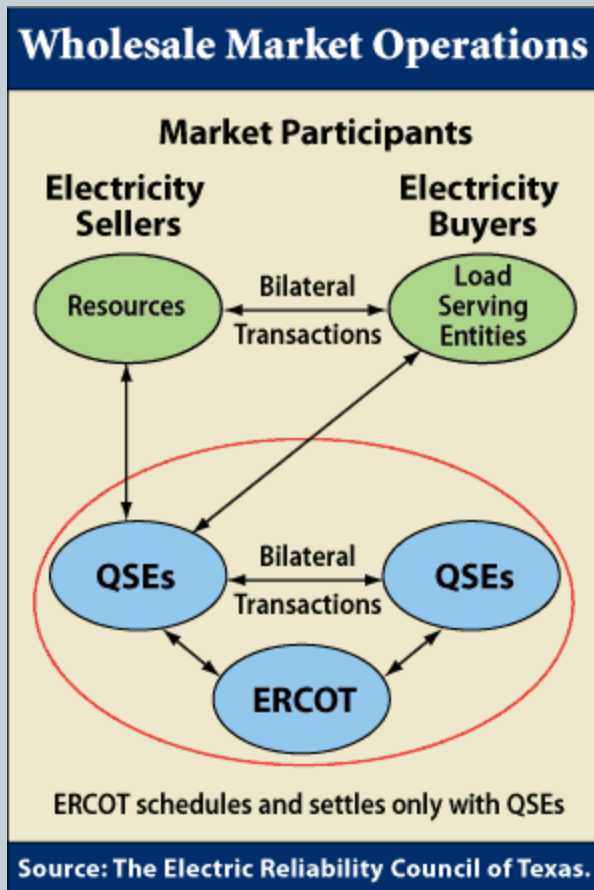
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- The ERCOT energy-only market, with scarcity pricing of \$9,000/MWh, allows for this price risk to be managed through a number of mechanisms.
  - The price risk can be contracted around by both generators and load.
  - The price risk can be managed by load by voluntary reduction of load during scarcity events.



# Managing Risk: The Use of Bilateral Contracts

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Most energy (over 95 percent) consumed within the ERCOT power region is purchased through the bilateral market, so called because it involves contracts between power generating companies and load serving entities (LSEs), which can be retail electric providers, municipally owned utilities or cooperatives. The power purchased through these agreements is then scheduled through bids submitted in the ERCOT day ahead and real-time markets through Qualified Scheduling Entities (QSEs).

Historically this is the mechanism that market participants have used to manage risk.

# Demand Response

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- Demand Response (DR): Changes in electric usage by demand-side resources in response to changes in the price of electricity to lower electricity use upon the request of ERCOT at times when system reliability is jeopardized in exchange for a capacity payment. In the ERCOT market demand response products and services have developed over time for customers that have the ability to reduce or modify electricity use in response to instructions or signals.

## Demand Response (cont'd)

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- Two sub-categories of DR
  - Emergency Response Service (ERS) and Load Response Service (LRS): Loads procured and deployed by ERCOT as emergency reserves and ancillary services.
  - Price responsive DR
    - ✦ Pure market driven activity: Loads managing their consumption to arbitrage market price differences, manage high price risk and, where applicable, transmission cost allocation.
    - ✦ ERCOT's Ultimate goal: Retail customers bidding their load into SCED.

# Four Ways To Monetize Electricity Use Inside ERCOT

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- **4 Coincident Peak (4CP) management.**
  - Transmission level customers can reduce their annual transmission costs.
- **Price responsive demand**
  - Customers can arbitrage reduced load.
- **Participate in ERS or LRS as load response.**
  - Be paid to be available and able to curtail, whether or not curtailment is actually necessary.
- **ERS participation as a small generator.**
  - Get paid to be able to generate electricity, whether or not called upon to do so.

# 4CP Management

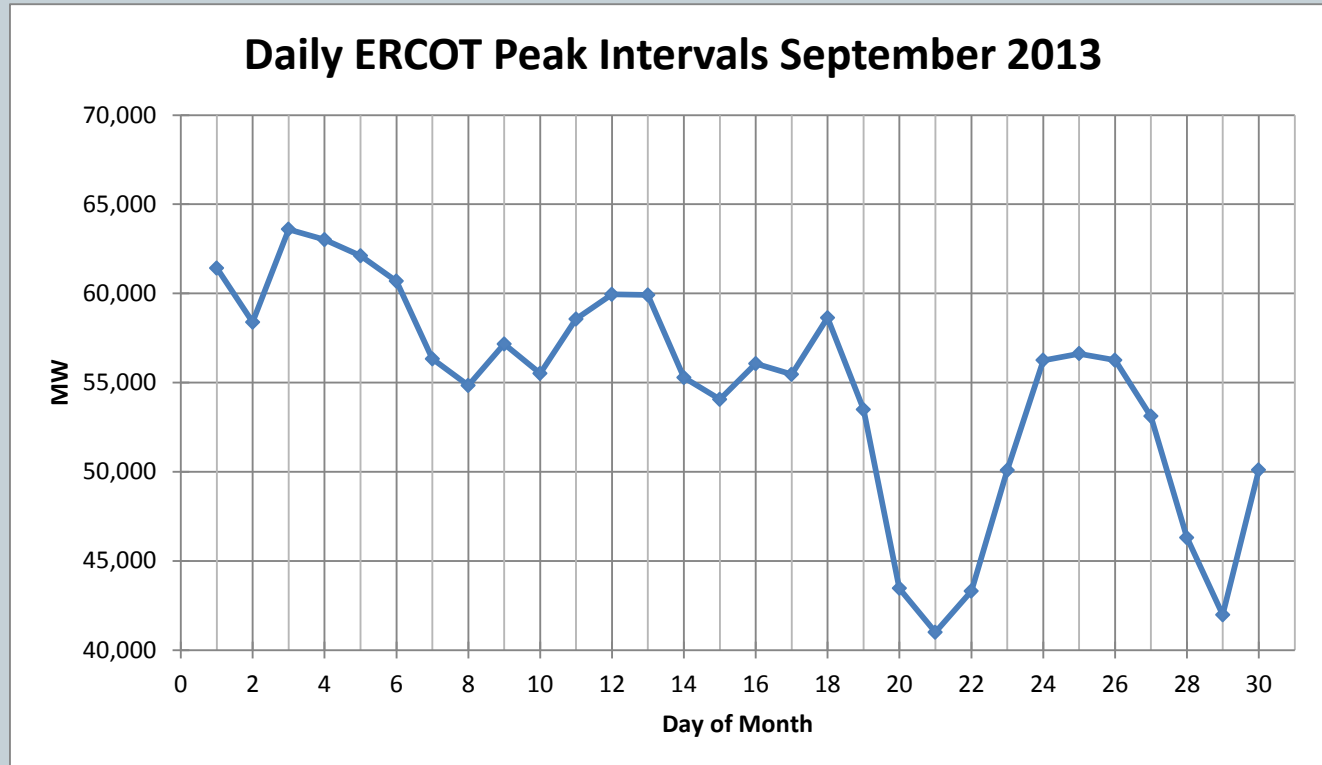
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- Transmission level customers' transmission cost are determined on a load share basis.
- 4 CP management is a very specific example of reducing load to reduce *costs*. It is similar to DR & PR because it involves reducing load.
- 4CP- What is it?
  - Transmission level customers manage 4CP to avoid cost.
  - 4 – The four months of June, July, August and September are the months that make up 4CP.
  - CP – coincident peak. In each of the 4 months, the 15 minute period during the day that has the highest load in ERCOT, usually around 5:00 p.m. It is this 15 minute period that sets the peak for transmission level customers.
  - After the last peak (the September occurrence), the four individual measurements are averaged for the transmission level customer. The customer's average as a ratio to all transmission level customers determines what the customer's transmission charge will be for the next year. The higher the 4CP, the higher the cost to the customer.

# 4CP Management

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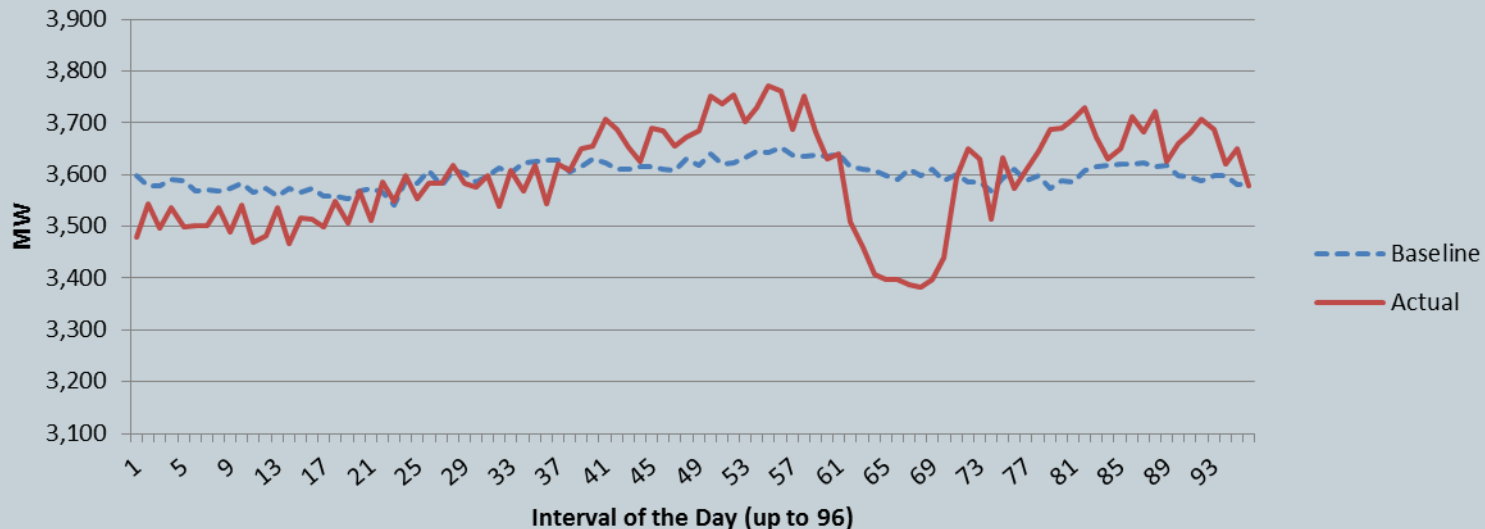
- This chart shows that the peak for September 2013 occurred on the 3<sup>rd</sup> and was about 64,000 MW. The actual time of the peak was 16:45, or the 67<sup>th</sup> 15 minute interval of the day.



# 4CP Management

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- Some entities managed their 4CP on September 3<sup>rd</sup>.



- This shows how some transmission level customers reduced their load (and hence their ratio share of transmission costs) because they anticipated that a peak would occur on September 3, 2013 from 4:00 p.m. until 5:30p.m. The predicted transmission level load (Baseline) was substantially higher than the actual load during that period.

## 4CP Management (cont'd)

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- Transmission level consumers that reduced their load during this coincident peak in September 2013 lowered their transmission charge for 2014.
- The total reduction was 350 MW or about 9.3% of the total transmission level load.



# \$9,000/MWh Encourages Demand (Price) Response

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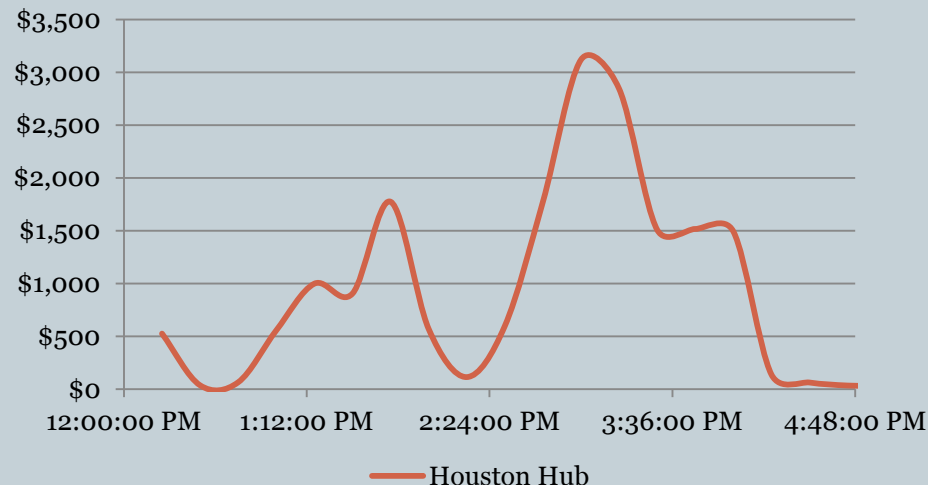
- Consumers with a large load that can be self-curtailed benefit from the market with a properly set SWOC because they can monetize their curtailment.
- Some retail electric providers (REPs) offer plans for participation in DR, and some offer individual plans for industrial and commercial consumers that have large curtailable loads.
- Additionally, there are entities that will aggregate loads that are capable of being curtailed. The compensation offered these loads depends upon the program offered by the aggregator.

# DR Can Capture Scarcity Prices

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- Market driven DR promotes conservation and efficiency when most needed, which is when load approaches available capacity and scarcity pricing occurs.
- Example: The chart below illustrates how DR at the Houston Hub could be financially rewarding to both the REP and the consumer if load had curtailed during this scarcity pricing event.

**Houston Hub Prices: May 30,  
2015 12:00-5:00**



# Emergency Response Service (ERS)

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- ERS is backup generation and load that can be curtailed. Both must be able to deploy quickly in order to help maintain grid stability and reliability.
- ERS providers are paid a contract payment for their capacity and receive electricity market prices when deployed during an energy emergency alert period.
- Some key aspects of ERS are:
  - An ERS resource is a load or aggregation of loads capable of reducing consumption at ERCOT's request, or a generator which is capable of being dispatched, that is not registered with ERCOT as a resource.
  - ERS is procured by ERCOT for a 4 month period through an auction process.
  - An ERS resource must be represented by a qualified scheduling entity.
  - ERCOT is limited to spending \$50 million/year for ERS.

# Emergency Response Service (ERS)

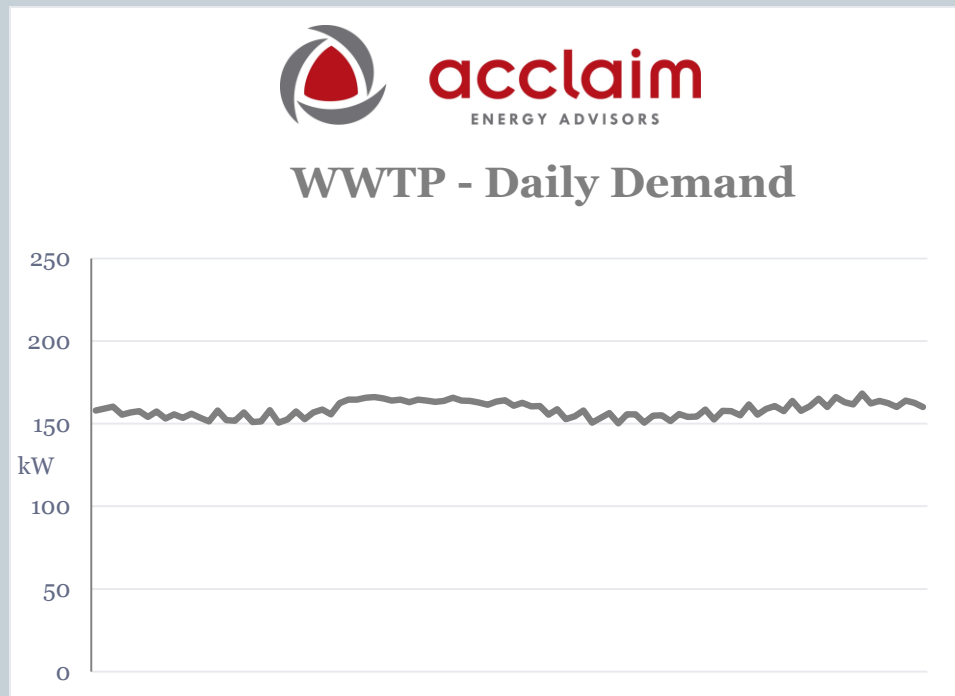
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- When they are deployed, the ERS provider (if a generator), is paid the market price for electricity, and because of the nature of the deployment, the market price is likely to be high.
- If, on the other hand the ERS provider is a load resource, then the load resource may be able to monetize its curtailment through the load resource's contract with its retail electric provider.

# Waste Water Treatment Plant Participation

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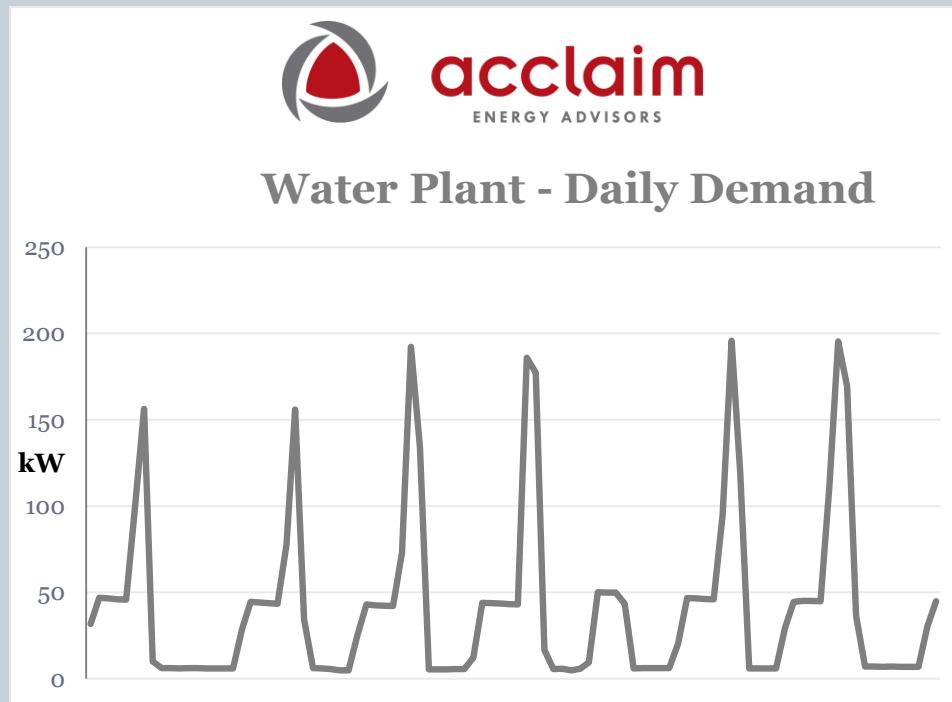
- ERCOT periodically tests the ERS provider to ensure that it is actually available to generate electricity or curtail load.
- With steady demand, a waste-water treatment plant that can curtail load is a good candidate to participate as DR.



# Water Plant Participation

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- With variable demand, a water plant may or may not be able to participate in DR.
- But in either case, a plant that has generating assets as backup power may be able to participate as a small generator resource.



# Contact Information

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